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DISCOVERY OF THE GREAT LAKE TROUT, *CRISTIVOMER NAMAYCUSH*, IN THE PLEISTOCENE OF WISCONSIN

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Some fish remains consisting of a portion of a skull and a number of associated elements, from an interglacial clay deposit in Dunn County, Wisconsin, were recently sent to me for identification by Dr. S. Weidman, of the State Geological Survey of Wisconsin. They turned out to be remains of the great lake trout, *Cristivomer namaycush*, a species now living in Wisconsin waters. They are therefore of interest as carrying back the history of this species to Pleistocene times. Through the kindness of Dr. Weidman, I am permitted to present the following notes on the specimens.

The remains consist of a portion of a skull of a fish about two feet in length, with most of the jaw elements belonging to it, and a number of thin and more or less fragmentary bones pertaining to the opercular and hyoid series. Associated with these remains was a toothed fragment of the jaw of another species of fish, as yet undetermined.

The genus *Cristivomer* is distinguished from all other trouts and salmons (family Salmonidæ), by the shape of the vomer. This element, in side view, and held with the oral face up, is boat-shaped, with a raised crest armed with strong teeth, extending in the median line of the oral face, from the head of the bone backward (Fig. 1*b*). By this element alone the remains are identifiable as belonging to genus *Cristivomer;* and all doubt whatsoever is removed on comparing the other bones with a disarticulated skull of the living lake trout. The correspondence bone for bone is very close, extending to details, so that the fossil form cannot be separated even as a variety from the existing one.

No detailed discussion of the several elements seems necessary; reference may be made to Fig. 1, in which the better preserved

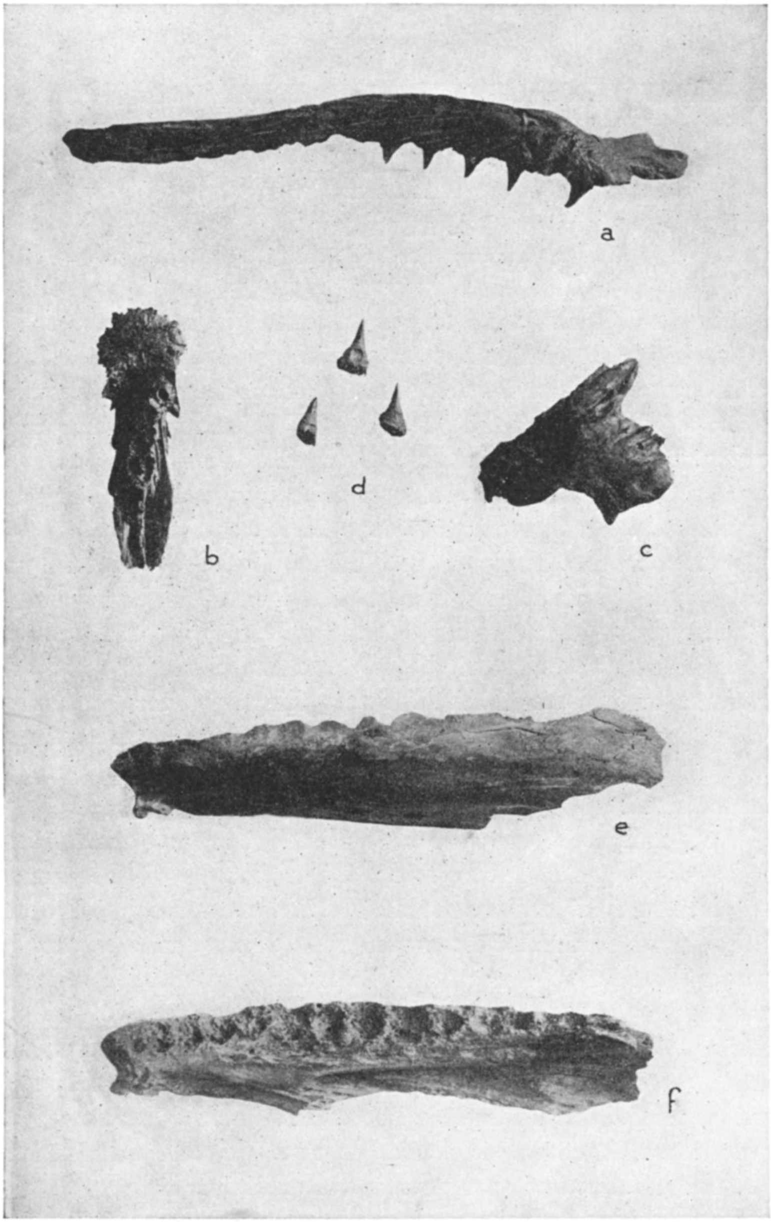

FIG. 1.—*Cristivomer namaycush.* Jaw elements belonging to a single fish, ×$\frac{4}{5}$. Pleistocene; Menomonie, Dunn County, Wisconsin.

a, right maxilla; *b*, vomer, in oral view; *c*, left premaxilla; *d*, teeth from mandible and vomer; *e*, left mandible, outer view; *f*, right mandible, inner view.

of the elements are shown. The parasphenoid is also preserved. It is seen on the under side of the posterior portion of the skull roof, which is the only part of the upper skull surface preserved. This element also agrees closely with that of the existing species.

The discovery of fossil remains of *Cristivomer* is interesting but not unexpected; for the existing species has a wide range in the colder waters of north temperate America, extending into the sub-arctic region. Jordan gives the distribution as follows: "All the larger lakes from New England and New York to Wisconsin, Montana, the Mackenzie River, and in all the lakes tributary to the Yukon in Alaska."[1]

From the extent of this range one would have inferred that the species must have had a long time in which to "spread out" over such an area, and hence that it dated back to at least Pleistocene times. The finding of this specimen proves that this was the case. It shows, moreover, that the genus existed during glacial times in the same region as today, so that its antecedent history—whether it arose in the same region, or wandered into it from somewhere else—dates back to an even earlier time.

The specimen is preserved in the collection of the Wisconsin Geological Survey. The following measurements may be of use for future reference:

VOMER	
Length	44 mm.
Width at neck	12
PREMAXILLA (Left)	
Length, measured along toothed edge	33
Height, at posterior end	27
MAXILLA (Right)	
Total length	105
Length exclusive of anterior process (measured along toothed margin)	95
MANDIBLE	
Both are defective posteriorly; the left as far as preserved measures	95

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[1] Jordan, *Guide to the Study of Fishes*, II, 115.

The specimen was collected from a clay bed at Menomonie, Dunn County, Wisconsin. At this locality these beds are from twenty to forty feet in thickness. The following notes regarding them were kindly supplied by Dr. S. Weidman to whom I am also indebted for the geological section here reproduced (Fig. 2).

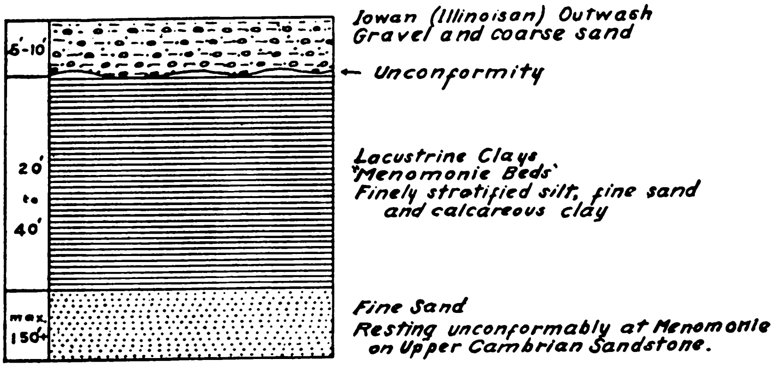

FIG. 2.—Section at Menomonie, showing relations of Pleistocene lacustrine clay beds.

The clay beds are located in the valley of Red Cedar River and have been utilized extensively for many years for the manufacture of brick. The formation consists of finely stratified sand, silt, and clay, usually containing from 5 to 10 per cent of calcium and magnesium carbonate. In other localities the calcareous content is much higher and reaches 20 to 30 per cent. The physical and chemical character of the deposit, as well as the occurrence of the fish remains, indicate the lacustrine origin of the formation. Similar deposits are widespread in Wisconsin and the adjoining states, and have very generally been classed as lacustrine or estuarine. . . . .

The relations of the lacustrine clay ("Menomonie beds") to the overlying Iowan (Illinoisan) glacial gravels indicate that the probable age of the clay is the Interglacial stage between the Kansan and the Iowan (Illinoisan), that is, between the second and third glacial stages of the Pleistocene. No definite relations of the clay beds at Menomonie to the Kansan is exhibited, the border of the Kansan being located 10 or 12 miles to the west, but, based in part on other geologic data, the above inference as to the age seems warranted. The stratigraphic position of the clay beds, in which the species of fish, *Cristivomer namaycush*, is found is therefore near the middle of the Pleistocene series, and as variously estimated in years this particular deposit is probably between 250,000 and 500,000 years old.

Besides the remains of fish, there have been found in the Menomonie clay beds the remains of various mammals such as the elephant, mastodon, reindeer, caribou;[1] the bones of other mammals, the leg bone of a bird, and also fragments of wood identified as spruce.

The fossil remains of the land mammals and of forest trees found in the clays are only in fragmentary pieces, indicating the fact that these were carried some distance by streams, or currents along the lake shore, and dropped into the bed of the old lake.

The remains of the fish, on the other hand, are fairly complete specimens, and seem clearly to indicate that these fish lived in the lake in which the clays were deposited.

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[1] *Rangifer*, probably an extinct species, is represented by both male and female antlers, the latter identified by Dr. O. P. Hay.